

## **Chapter 10: Equipment Program and Other Projects**

The Equipment Program provides the tools needed for the continued operation of Muni's operating, maintenance and administrative functions, such as the replacement or acquisition of such items as rail grinders and computers. Many of the projects in this program are related to technology and communications. Other Projects include security projects, such as the Graffiti Prevention and Security Program.

Highlights of Muni's technology and communications initiatives are described in this chapter. The Translink® regional fare card project is described in Chapter 6, along with other fare and transfer topics. All of the existing capital project descriptions are included at the end of Chapter 11.

### **Recent Accomplishments**

Technology projects are critical to maintaining and improving Muni's service delivery and internal efficiency. Projects are developed with input from all divisions within Muni and DPT. The following technology projects have been completed in the past two years:

- Upgrades to Shop History and On-line Parts System (SHOPS);
- Trapeze Operator Scheduling Software;
- Automatic Passenger Counters and analytical reporting software for 110 vehicles;
- The DTIS-SFMTA Fiber loop that links major SFMTA sites;
- SFgo Traffic Management Center and Initial Phase (intersection interconnection and traffic monitoring camera installation); and
- Activating entire revenue fleet for AVL predictions used for NextMuni real-time vehicle arrival information.

### **Geographic Information Systems**

Spatial data is crucial to the SFMTA's mission of providing transportation services. Enhancing the SFMTA's Geographic Information System (GIS) capabilities will facilitate easier sharing of spatial data within the SFMTA and with other agencies, including MTC's 511.org, which provides a public transit trip planning service through the Regional Transit Information System. By maintaining precise stop and route locations, the GIS additionally provides base data that is crucial for the NextMuni passenger information system and the Scheduling and Operator Dispatch system. The SFMTA's GIS will leverage the NextMuni vehicle location data to improve its mileage and time point adherence reporting. The system also adds map-based reporting tools to TransitSafe to show incident hotspots and location analysis to guide corrective action for improved passenger safety. Facility and overhead department electronic maps will enhance system reliability and safety through linear referencing of assets, inspections and repairs. For service and accessible service planning, map surveys and analysis of demographic, curb cut and slope data will contribute to better system design, customer convenience, safety, and public information. The GIS also allows the SFMTA to assess and predict spatial impacts of route modifications and construction on city residents and businesses. Improved GIS capabilities will also support a future SFMTA command center for incident and disaster management by providing real-time vehicle location, passenger counts, routing instructions to and from incident locations, and can provide maps and facility schematics to responders in the field.

## Automatic Vehicle Locator System and NextMuni

Automatic Vehicle Location (AVL) system data provides real-time vehicle location information, and generates live transit information and arrival predictions to transit patrons. AVL system data also provides operations line managers continuous updates of vehicle locations, headway, and on-time reports, which assist operations managers in line management and recovery from service disruptions. In addition, archived AVL data provides the basis for performance and schedule adherence analysis and reporting.

Muni issued a competitive AVL System Request for Proposals in April 2001 and issued Notice to Proceed to NextBus in August 2002. The 5-year contract (since extended) provided for system design and implementation to all Muni revenue vehicles and service routes, which is now complete.

There are about 4,000 Muni stops in San Francisco. Muni only has funding to install 450 wayside NextMuni signs. The NextMuni signs require electrical power to operate and they must be installed in a protected, sheltered area. Approximately 1,000 bus shelters currently have electrical power.

With this technology, passengers, Muni managers, and the general public have the ability to access specific arrival information via the Internet at NextMuni.com, hand-held cellular devices, and/or illuminated shelter signs. AVL systems increase customer satisfaction by reducing unnecessary waiting, with the added benefit of providing vehicle arrival information and on-time performance data to Muni management. As of December 2007, schedule adherence reports were available to check and adjust transit schedules. Muni field inspectors' vehicles were being equipped with laptops allowing them to use NextMuni in their daily work.

DPT's SFgo project will receive AVL data for integration into its Traffic Management Software system, to coordinate traffic signals for implementing centralized traffic priority and to facilitate on-time transit service. Muni also provides AVL data to the MTC's 511 system to deliver arrival information to transit patrons throughout the Bay Area region. The final implementation of this project for the existing revenue fleet and for wayside signs will be complete by August 2007.

As a separate project, the Accessible Services Program developed a proposal to procure AVL equipment for installation in paratransit vans. There are approximately 54 paratransit vans providing nearly 11,000 trips per month. The AVL system will be used to increase the monitoring of paratransit vans, enhance communications between dispatchers and drivers, improve the customer reliability response to "where's my ride" phone calls, and generate more accurate on-time performance reports.

## Regional Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) projects are those electronic and communications systems that collect, process, disseminate, or act on information in real-time to improve the operation, safety or convenience of transportation systems. The U.S. Department of Transportation has developed the National ITS Architecture and a related set of tools and standards to facilitate coordination among systems and across agency and regional boundaries. The federal government required that ITS projects seeking federal funding after April 2005 procure those projects within the framework of a regional ITS architecture.

To address both the needs and opportunities for integration of ITS projects, MTC sponsored development of a Regional ITS Architecture and an ITS Strategic Deployment Plan for the nine-county San Francisco Bay Area. SFMTA is an active stakeholder in the MTC's Regional Architecture project. The ITS Initial Regional Architecture and ITS Deployment Plan was finalized in July 2004 and is now in the process of being updated. The updated Regional Architecture is expected to be available in November 2007. In addition to the projects listed in this Equipment Program Section, other projects in the SRTP have ITS elements.

### **SFgo**

The mission of SFgo is to provide multi-modal, real-time traveler information to the public and to improve traffic flow citywide. SFgo will replace the deteriorating traffic signal communications infrastructure and implement ITS tools to enhance traffic analysis, provide transit signal priority and improve maintenance procedures. These tools include advanced traffic signal controllers, traffic cameras, video detection, variable message signs, a communications network, Transportation Management Center (TMC) and remote workstations. One of the goals of SFgo is to use ITS to improve Muni's on-time performance and advance the Transit First Policy. Muni is a key stakeholder in the SFgo project and has actively participated in the SFgo Technical Advisory Committee since 2001.

The benefits of this partnership can already be seen along the Third Street corridor. The new light rail project included installation of advance traffic signal controllers and fiber optic cables that enable the most advanced transit signal priority technology in the nation. This has resulted in an approximately 10% reduction in train travel time. Transit priority helps Muni improve on-time performance and reliability, and increases Muni's modal share of the travel market. Transit signal priority will be implemented citywide in phases as the SFgo program expands.

The SFgo Initial Phase has been mostly completed with the exception of the center-to-center integration. The Initial Phase includes 35 intersections in the South of Market Area, 14 traffic cameras, 5 video detection systems, and 4 variable message signs. LRT transit signal priority was also upgraded along the Embarcadero from Mission to AT&T Park. It also includes final build-out of the Main TMC and the remote workstations at AT&T Park and the DPT Traffic Signal Maintenance Shop. The remote workstations have provided the Parking Controller Officers and the DPT Signal Shop with the same functionality as the Main TMC. A Parking Control Officer can monitor street conditions during special events around AT&T Park and display necessary messages on the variable message signs. The Traffic Signal Shop has tools to detect signal malfunctions or failures immediately through the SFgo network.

Completion of the SFgo Center to Center (C2C) integration, scheduled in the fall of 2007, will allow SFgo to exchange data and video with the Caltrans Transportation Management Center for the Bay Area located in Oakland. For example, it will allow SFgo and Caltrans to display variable message signs for each other. It will also allow control of each other's traffic cameras. The C2C integration will result in cost saving as it would allow Caltrans to help operate the SFMTA system during off hours since their control center operates round the clock. C2C integration also enables SFgo to integrate with the SFMTA network with great security. This would enable access to the SFgo network, for example from the SFMTA emergency command center.

SFgo is currently implementing a joint pilot project with the San Francisco Fire Department to provide emergency signal pre-emption for fire trucks at 30 intersections around the five busiest fire stations in the City, using GPS technology. The "before" and "after" study of this pilot

project will be completed in the summer of 2007. The GPS equipment will also be installed on two Muni vehicles in order to collect necessary data for an evaluation of its effectiveness for transit signal priority, a potentially improved technology.

Expansion of SFgo includes Third Street, Oak/Fell Streets, and the Central Freeway area. Both the Third Street and Fell/Oak Streets corridors already have advanced traffic signal controllers and are part of the SFgo communications network. Traffic cameras, video detection and variable message signs will be added to help SFgo collect more roadway data as well as provide information to the public. The land sale of parcels along the Central Freeway frontage will occur within the next two years. The proceeds will be used for various auxiliary projects including SFgo expansion. SFgo plans to replace some 65 traffic signal controllers, installing fiber cables and upgrading curb ramps with the Central Freeway area.

Also, a Parking Guidance System has been proposed for City-Owned Garages in the Downtown and the Civic Center Areas. This project will use a combination of variable message signs (VMS) and static guide signs to direct travelers, particularly non-San Francisco residents, to the garages with available parking spaces. VMS will be strategically located on major streets between the freeway off-ramps and garages. Static guide signs will be installed to supplement the VMS. The benefits of a parking guidance system include: 1) direct travelers efficiently to the appropriate streets with garages that have vacant parking spaces, 2) reduce delays to Muni vehicles that are caught in circulating traffic looking for parking or delayed by queues outside full garages, and 3) utilize existing parking resources to the fullest extent and help improve garage operations without the need to build new garage facilities. Similar systems throughout the United States have proven to be effective for parking garages located at airports and in the central business district of cities.

As part of the Proposition K 5-Year Prioritization Program, completed in 2004, DPT identified some 18 projects to help expand the SFgo network. These projects include planning, software improvements, integration with Muni Central Control, Caltrans and 511, and construction projects along various corridors. As we complete several identified priority projects and other priorities have risen, we will update our project list in the summer of 2007 as part of the Proposition K 5-Year Priority Program Update effort.

The total cost to implement the SFgo Program is estimated to be \$215 million. Recently, SFCTA and SFMTA were awarded a U.S. DOT Urban Partnership Program grant for the Doyle Drive Value Pricing Program. SFCTA is leading the congestion pricing demonstration component. As part of a package of improvements to complement the congestion pricing program, SFMTA will utilize \$58 million of those grant funds for expansion of SFgo traffic operations and \$20 million for the SF Smart Parking Program. "Congestion pricing" includes the concept of charging drivers more during peak periods, potentially taking the incremental revenues and using to support transportation improvements that could also help reduce congestion impacts. (Full funding is contingent on meeting certain milestones, for example, tolling drivers on Doyle Drive during peak periods.)

SFgo will provide upgrades to the infrastructure of all arterial routes in the Doyle Drive corridor, providing improved corridor management. These areas include Lombard/Van Ness and Geary corridors, 19<sup>th</sup> Avenue/Park Presidio, and the North Point corridor. The infrastructure upgrades include advanced traffic signal controllers, fiber optic cable, variable message signs, and cameras. Furthermore, transit signal priority will be provided on Lombard Street and proposed BRT routes (Van Ness Avenue and Geary Boulevard). This will enable buses operated by Muni

and Golden Gate Transit to be detected by GPS technology, triggering an extended green phase at downstream signals so that they can pass through intersections without delay. Also, the grant will provide Accessible Pedestrian Signals (APS) for the visually impaired at selected locations, as well as pedestrian countdown signals at signalized locations lacking pedestrian signals.

The SF Smart Parking program is a multi-faceted approach to parking management in downtown San Francisco. As part of the City's Transit First policy, improvements to the city's transportation network seek to increase the efficiency of existing transportation infrastructure and encourage use of public transportation by easing congestion that delays transit operations. The \$20 million award will provide the majority of the funding required for a parking guidance system to direct drivers to Parking Authority garages. It will also help implement off-street parking pricing and payment programs using variable pricing with FasTrak and TransLink®. This could encourage drivers to shift travel to off-peak times, thereby reducing traffic congestion.

The U.S. DOT Urban Partnership Program grant is in addition to previously awarded \$15 million in Federal grants for the SFgo Initial Phase Implementation and expansion. Proposition K also provides \$19.6 million over the next 30 years, of which \$2 million has been allocated for the Third Street Corridor and Oak/Fell Street projects. Staff continues to pursue grant opportunities through collaboration with program partners and stakeholders.

### **Radio Communications System Replacement**

Replacement of obsolete communications systems, emerging FCC rule changes, and the introduction of new technologies are generating the need for updated wireless voice and data communications systems. Muni has embarked on a program to replace its now-obsolete radio system with a state-of-the-art wireless communications system. The new radio system will provide the wireless "backbone" to allow implementation of a variety of ITS applications dependent upon reliable and high-capacity communications between Muni's Central Control and its revenue fleet. The project will include wireless short-range vehicle-to-wayside data communications, for installation at the maintenance yards, to support data transfers for ITS Vehicle Projects. An additional goal is to provide communications interoperability with the Department of Emergency Management's existing radio system and regionally with neighboring agencies' communications system in a Project 25 (P25) voice and data core network currently being established. Muni has secured federal ITS grants for the development of procurement specifications for an "ITS backbone" voice-and-data radio system, and is seeking funding for procurement of the replacement radio system by 2013.

### **Fare Revenue Integration and Reporting System**

Currently Muni uses several systems to manage fare revenue data and cash reconciliation. The Fare Revenue Integration and Reporting (FRIAR) system will bring fare revenue data from all sources into one database to be used for cash reconciliation, financial reporting, ridership trend analysis, and long range planning. This system will replace aging data collection systems and inefficient manual processes.

### **Central Control Incident Management System**

The Central Control Incident Management system will replace the aging Central Control Log application with a real-time incident management system. A real-time application will enable faster communications during the course of regular business and during emergencies. By

making incident data available throughout the organization as it happens, the SFMTA can be more responsive to operational situations and make more information available to passengers through the Internet, interactive messaging, and Passenger Services.

### **Enterprise Application Interface**

The Enterprise Service Bus is an integration tool that will tie all of SFMTA's distributed applications together. The system will follow a web services management model and will allow SHOPS, Trapeze, TransitSafe, NextMuni and other new or legacy systems to communicate or broker information. This project will call data from multiple systems together to offer real-time dashboard views for Managers to use daily to monitor and improve system performance.

### **Central Control Facility**

The current Central Control Facility is undersized for its existing use, contributing to inefficiencies and limiting the functions that can be accommodated. Expansion or relocation of the facility is needed to provide adequate space for existing functions, and to accommodate expanded service for the Central Subway, BRT lines, and historic rail. Rigorous post-9/11 security requirements will have to be addressed. Current options include: 1) expansion of the existing site; 2) construction of a new facility at the current site; 3) relocation to the new SFMTA Headquarters at One South Van Ness; or 4) relocation to another site to be determined. Interim improvements, such as a digital voice recording and phone system and software upgrades, are being pursued.

### **Vehicle Training Simulators**

State-of-the-art bus and rail training simulators would be very valuable in making training more effective. More realistic training should lead to safer operations. SFMTA intends to purchase 360-degree computer training stations for bus operators and a rail training simulator with five classrooms providing a virtual learning environment. However, this project is currently unfunded.